

What is claimed is:

1. An apparatus, for use with an image sensor having an array of pixels each of which outputs digital image data corresponding to one or more characteristics of light incident thereon, for detecting and compensating for a defective pixel, which comprises:

means for detecting and determining whether a target pixel is defective based on a check condition, the condition being that image data of the target pixel has a value larger than a first coefficient representing a maximum value of image data of adjacent normal pixels or a value smaller than a second coefficient representing a minimum value of image data of adjacent normal pixels; and

means for compensating the image data of a target pixel deemed to be defective and outputting compensated image data in response to the image data of the target pixel, the maximum value of image data of adjacent normal pixels, the minimum value of image data of the adjacent normal pixels, a defective pixel determination signal representing that the target pixel is defective, and a minimum or maximum range violation signals representing that the image data of the defective pixel violates the maximum or minimum ranges in the check condition, which are provided thereto from the defective pixel detection means.

2. An apparatus according to claim 1, wherein the defective pixel detection means includes:

a first line memory for storing therein the image data fed thereto from the unit pixel on a line-by-line basis;

a second line memory for receiving the image data stored in the first line memory and storing the same therein;

a two-dimension space filter for receiving the image data fed thereto from the second line memory, the image data inputted thereto from the first line memory and the image data

provided thereto from the unit pixel, and storing each of the image data in a first set of lines, a second set of lines, and a third set of lines, respectively; and

a defective pixel determination means for receiving the image data provided thereto from the space filter, determining whether or not image data of a target pixel is defective based on the check condition, and outputting a defective pixel determination signal, a minimum range violation signal and a maximum range violation signal according to determined results, wherein the defective pixel determination signal represents that the image data of the target pixel has a value larger than the first coefficient of the maximum value of image data of adjacent normal pixels in the space filter, or a value smaller than the second coefficient of the minimum value of image data of adjacent normal pixels in the space filter, the maximum range violation signal representing that the image data of the target pixel has a value larger than the first coefficient; and the minimum range violation signal representing that the image data of the target pixel has a value smaller than the second coefficient.

3. An apparatus according to claim 2, wherein the defective pixel compensation means includes:

means for combining the minimum range violation signal and the maximum range violation signal provided thereto from the defective pixel detection means;

a first selection means for selectively outputting the minimum image data or the maximum image data in response to output from the combining means; and

a second selection means for selecting one of the output signal from the first selection means and the image data of the target pixel, in response to the defective pixel determination signal from the defective pixel determination means, and outputting the same as the compensated image data;

if the image data of the target pixel has a value larger than the first coefficient of the maximum image data and is determined as the defective pixel, the maximum image data is

outputted as the compensated image data; and

if the image data of the target pixel has a value smaller than the second coefficient of the minimum image data and is determined as the defective pixel, the minimum image data is outputted as the compensated image data.

4. An apparatus according to claim 3, wherein the first and the second coefficients are selected based on process characteristics of the image sensor.

5. An apparatus according to claim 3, wherein the first and the second coefficients are 1.1 and 0.9, respectively.

6. An apparatus, for use with an image sensor having an array of pixels each of which outputs digital image data corresponding to one or more characteristics of light incident thereon, for detecting and compensating for a defective pixel, which comprises:

a defective pixel detection circuit constructed and arranged to determine whether a target pixel is defective based on a check condition, the condition being that image data of the target pixel has a value larger than a first coefficient representing a maximum value of image data of adjacent normal pixels or a value smaller than a second coefficient representing a minimum value of image data of adjacent normal pixels; and

a compensation circuit constructed and arranged to compensate the image data of a target pixel deemed to be defective and output compensated image data, in response to the image data of the target pixel, the maximum value of image data of adjacent normal pixels, the minimum value of image data of the adjacent normal pixels, a defective pixel determination signal representing that the target pixel is defective, and a minimum or maximum range violation signals representing that the image data of the defective pixel violates the maximum or minimum ranges in the check condition, which are provided thereto from the defective pixel detection circuit.

7. An apparatus according to claim 6, wherein the defective pixel detection circuit includes:

a first line memory for storing therein the image data fed thereto from the unit pixel on a line-by-line basis;

a second line memory for receiving the image data stored in the first line memory and storing the same therein;

a two-dimension space filter for receiving the image data fed thereto from the second line memory, the image data inputted thereto from the first line memory and the image data provided thereto from the unit pixel, and storing each of the image data in a first set of lines, a second set of lines, and a third set of lines, respectively; and

a defective pixel determination circuit constructed and arranged to receive the image data provided thereto from the space filter, determine whether or not image data of a target pixel is defective based on the check condition, and output a defective pixel determination signal, a minimum range violation signal and a maximum range violation signal according to determined results, wherein the defective pixel determination signal represents that the image data of the target pixel has a value larger than the first coefficient of the maximum value of image data of adjacent normal pixels in the space filter, or a value smaller than the second coefficient of the minimum value of image data of adjacent normal pixels in the space filter, the maximum range violation signal representing that the image data of the target pixel has a value larger than the first coefficient, and the minimum range violation signal representing that the image data of the target pixel has a value smaller than the second coefficient.

8. An apparatus according to claim 7, wherein the defective pixel compensation circuit includes:

combining logic constructed and arranged to combine the minimum range violation

signal and the maximum range violation signal provided thereto from the defective pixel detection means;

a first selector constructed and arranged to selectively output the minimum image data or the maximum image data in response to output from the combining logic; and

a second selector constructed and arranged to select one of the output signals from the first selector and the image data of the target pixel, in response to the defective pixel determination signal from the defective pixel determination circuit, and output the same as the compensated image data, wherein

if the image data of the target pixel has a value larger than the first coefficient of the maximum image data and is determined as the defective pixel, the maximum image data is outputted as the compensated image data; and

if the image data of the target pixel has a value smaller than the second coefficient of the minimum image data and is determined as the defective pixel, the minimum image data is outputted as the compensated image data.

9. An apparatus according to claim 8, wherein the first and the second coefficients are selected based on process characteristics of the image sensor.

10. An apparatus according to claim 8, wherein the first and the second coefficients are 1.1 and 0.9, respectively.